

## PATENT COOPERATION TREATY

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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P017897WO WIL	<b>FOR FURTHER ACTION</b>	See Form PCT/PEA/416
International application No. PCT/GB2005/000355	International filing date (day/month/year) 02.02.2005	Priority date (day/month/year) 10.02.2004
International Patent Classification (IPC) or national classification and IPC INV. H01M8/04 H01M8/12		
Applicant CERES POWER LIMITED et al.		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>		
Date of submission of the demand  09.09.2005	Date of completion of this report  16.06.2006	
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  Horváth, L  Telephone No. +49 89 2399-2110	



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/GB2005/000355

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on
- ☒ the international application in the language in which it was filed
  - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
    - ☐ international search (under Rules 12.3(a) and 23.1(b))
    - ☐ publication of the international application (under Rule 12.4(a))
    - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))
2. With regard to the **elements\*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

**Description, Pages**

1-11 as originally filed

**Claims, Numbers**

1-22 received on 12.09.2005 with letter of 09.09.2005

**Drawings, Sheets**

1/11-11/11 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1-22
Inventive step (IS)	Yes: Claims	
	No: Claims	1-22
Industrial applicability (IA)	Yes: Claims	1-22
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

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**Box No. VIII Certain observations on the international application**

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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

## **1. Cited documents:**

- D1: SAHIBZADA M ET AL: "Operation of solid oxide fuel cells at reduced temperatures" FUEL, IPC SCIENCE AND TECHNOLOGY PRESS, GUILDFORD, GB, vol. 78, no. 6, May 1999 (1999-05), pages 639-643, XP004286001 ISSN: 0016-2361
- D2: PATENT ABSTRACTS OF JAPAN vol. 009, no. 220 (E-341), 6 September 1985 (1985-09-06) & JP 60 079675 A (SANYO DENKI KK), 7 May 1985 (1985-05-07)
- D3: PATENT ABSTRACTS OF JAPAN vol. 007, no. 222 (E-201), 4 October 1983 (1983-10-04) & JP 58 112262 A (TOKYO SHIBAURA DENKI KK), 4 July 1983 (1983-07-04)
- D4: US 2001/036566 A1 (DEKKER NICOLAAS JACOBUS JOSEPH ET AL) 1 November 2001 (2001-11-01)
- D5: GB-A-2 405 028 ( CERES POWER LIMITED) 16 February 2005 (2005-02-16)

## **2. Clarity:**

2.1. Claim 1 lacks clarity under Art.6 PCT for two reasons. Claim 1 defines the method in terms of a result to be achieved ("controlling one or more operating conditions ... to optimise said energy conversion efficiency during operation of the stack"). This is not allowable under Art.6 PCT and Par.5.35 of the PCT International Search and Preliminary Examination Guidelines.

2.2. Claim 1 also lacks essential features in that it doesn't contain specific technical steps to be taken, to achieve the desired result "to optimise said energy conversion efficiency during operation of the stack". It is not mentioned which operating conditions are to be controlled and in which manner to obtain the desired effect. It is not credible that by controlling an arbitrary operating condition (or more of them) of the SOFC in an arbitrary manner, will result in the optimisation of the energy conversion efficiency during operation of the stack (also see the PCT International Search and Preliminary Examination Guidelines Par.5.33).

2.3. Claim 11 lacks clarity under Art.6 PCT for two reasons. Claim 11 defines the device in terms of a result to be achieved ("controlling one or more operating conditions ...

to optimise said energy conversion efficiency during operation of the stack"). This is not allowable under Art.6 PCT and Par.5.35 of the PCT International Search and Preliminary Examination Guidelines.

2.4. Claim 11 also lacks essential features in that it doesn't contain specific technical features to achieve the desired result "to optimise said energy conversion efficiency during operation of the stack". It is not mentioned which operating conditions are to be controlled by which means, to obtain the desired technical effect. It is not credible that merely by providing means for determining a required power output of the stack and a controller will result in the optimisation of the energy conversion efficiency during operation of the stack (also see the PCT International Search and Preliminary Examination Guidelines Par.5.33).

2.5. Dependent claims 10,20,22 lack clarity under Art. 6 PCT because they make reference to the drawings of the application. Such reference is only allowed in cases where it is absolutely necessary as required by Rule 6.2. PCT

### **3. Novelty:**

3.1. All the documents cited in the search report anticipate the subject matter of claim 1 because the required power output of each fuel cell has to be determined during the design of the particular fuel cell. In all the fuel cells described in the documents cited in the search report, one or more operating conditions are controlled in some way, depending on the power output. Fuel cells are designed for a precisely determined required power output. As an example of operating conditions that are controlled in each fuel cell, the cooling system of the fuel cell is mentioned which controls the temperature of the cell. The fuel delivery system of a fuel cell delivers the quantity of fuel required by the necessary power output. Even though in some documents these systems are not explicitly mentioned they are considered as implicitly disclosed because a fuel cell cannot function without such systems. With regard to the feature "to optimise the energy conversion efficiency during operation of the stack", it is a result to be achieved and not a technical method step. For this reason it cannot be considered as limiting to the claim. Furthermore all fuel cell designers strive to optimise the energy conversion efficiency during operation of the stack and all fuel cells are controlled in a way, to optimise the energy conversion efficiency.

With regard to documents D1-D4 and the above reasoning claim 1 lacks novelty under Art.33(2) PCT.

Also, the requirements of Art.33(3) PCT are not met with regard to these disclosures.

3.2. Each of documents D1-D4 anticipate the subject matter of Claim 11 because each fuel cell has to contain means for determining a power output of the stack. Otherwise it would be impossible to operate a fuel cell system in an efficient manner. Also it is considered that each fuel cell contains a control system regulating its operation and controlling one or more operating conditions. Merely as an example each fuel cell has a cooling system, which regulates its temperature or each fuel cell has a control system for supplying the appropriate quantity of fuel to the stack. With regard to the additional feature "to optimise the energy conversion efficiency during operation of the stack" it is a result to be achieved and not a product feature. For this reason it cannot be considered as limiting to the product claimed.

With regard to documents D1-D4 and the above reasoning claim 1 lacks novelty and inventive step under Art.33(2) and (3) PCT.

3.3. The subject matter of claim 21 is known from the prior art. Fuel cells containing mixed ionic/electronic conducting electrolytes are known for example from document D1 (see col. 5). Control systems as mentioned in the claim are also known from the prior art (see the discussion of claim 11).

With regard to documents D1-D4 and the above reasoning claim 21 lacks novelty and inventive step under Art.33(2) and (3) PCT.

#### **4. DEPENDENT CLAIMS 2-9, 12-19**

4.1 Dependent claims 2-9, 12-19 contain features and embodiments which are known by a man skilled in the art and applied in the field of fuel cells. As a consequence they lack novelty and inventive step under Art.33(2) and (3).